

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. *(Currently Amended)* An optical disk device, comprising:

an optical head which emits a laser beam to an optical disk and receives a reflection light by using an objective lens, thereby carrying out one of a recording process and a reproduction process;

a position control portion which carries out position control of at least one of the optical head and the objective lens by a compensation gain based on a detection signal from the optical head; and

a disturbance learning portion which adjusts the compensation gain of the position control portion, detects disturbance information of the optical disk by using the optical head to ~~store it~~, and stores the disturbance information as learning disturbance information; and

a phase adjuster which adjusts a phase of the compensation gain according to a degree of reduction when the disturbance learning portion reduces the compensation gain of the position control portion;

wherein the disturbance learning portion reduces the compensation gain in a stepwise manner in a range in which position control of at least one of the optical head of the control portion and the objective lens operates, and detects and stores disturbance information of the optical disk by using the optical head,

wherein the disturbance learning portion has a detector for detecting rotation information based on a signal output from the optical head, and carries out learning of the disturbance information at a timing given by this rotation information, and

wherein the disturbance learning portion also stores the disturbance information of the optical disk in an area corresponding to a predetermined rotation number of the disturbance information.

2. *(Original)* An optical disk device according to claim 1, further comprising a focus mechanism control portion which controls a position of the objective lens mounted on the optical head based on a focus compensation gain, thereby controlling a focus of the laser light,

wherein the position control portion determines and supplies the focus compensation gain to be supplied to the focus mechanism control portion based on a detection signal from the optical head, and

the disturbance learning portion adjusts the focus compensation gain, and detects and stores disturbance information of the optical disk by using the optical head.

3. *(Original)* An optical disk device according to claim 1, further comprising a tracking position control portion which position-controls a position of the optical head based on a tracking compensation gain according to a target track,

wherein the disturbance learning portion adjusts the tracking compensation gain, and detects and stores disturbance information of the optical disk by using the optical head.

4. *(Original)* An optical disk device according to claim 1, wherein the position control portion further comprises:

a focus mechanism control portion which controls a position of the objective lens mounted on the optical head based on a focus compensation gain, thereby controlling a focus of the laser light; and

a tracking position control portion which position-controls a position of the optical head based on a tracking compensation gain according to a target track,

wherein the disturbance learning portion adjusts the focus compensation gain and the tracking compensation gain, and detects and stores disturbance information of the optical disk by using the optical head.

5.-6. *(Cancelled)*.

7. *(Original)* An optical disk device according to claim 1, wherein the disturbance learning portion carries out learning of the disturbance when the optical disk device does not carry out a recording process and a reproduction process.

8. *(Original)* An optical disk device according to claim 1, wherein the disturbance learning portion stores the disturbance information according to a timing of an output from an encoder coaxial to a spindle motor which rotates the optical disk at a predetermined rotation number.

9.-10. *(Cancelled)*.

11. *(Withdrawn)* An optical disk device according to claim 1, further comprising a gain adjuster circuit which receives a detection signal detected by the optical head to obtain an average value thereof, and increases or reduces the detection signal according to the average value.

12. *(Withdrawn)* An optical disk device according to claim 1, further comprising a gain adjuster circuit which receives a detection signal detected by the optical disk to obtain an average value thereof, increases the detection signal when the average value is equal to or smaller than a first predetermined value, and reduces the detection signal when the average value is equal to or greater than a second predetermined value in order to avoid an effect caused by a difference in physical characteristics between a recorded region and an unrecorded region of the optical disk.

13. *(Withdrawn)* An optical disk device according to claim 1, wherein the position control portion carries out position control of at least one of the optical head and the objective lens based on the learning disturbance information stored by the disturbance learning portion.

14. *(Withdrawn)* An optical disk device according to claim 1, wherein the position control portion controls the optical head to be jumped with a timing determined based on the learning disturbance information stored by the disturbance learning portion when the optical head is jumped to a target track.

15. *(Withdrawn)* An optical disk device according to claim 1, wherein the position control portion controls a tilt of the objective lens mounted on the optical head based on the learning disturbance information stored by the disturbance learning portion.

16. *(Withdrawn)* An optical disk device according to claim 1, further comprising a learning disturbance comparison circuit which, after the disturbance learning portion has stored the learning disturbance information, receives a positioning error signal based on a detection signal from the optical head, and compares a value of the positioning error signal with a value of the learning disturbance information while carrying out position control of at least one of the optical head and the objective lens by the position control portion based on the learning disturbance information,

wherein, in the case where the learning disturbance comparison circuit determines that these values are different from each other, the position control portion determines that a non-constant disturbance exists in the optical disk, and carries out position control of at least one of the optical head and the objective lens based on only the learning disturbance information.

17. *(Withdrawn)* An optical disk device, comprising:

an optical head which emits a laser light to an optical disk and receives a reflection light by using an objective lens, thereby carrying out one of a recording process and a reproduction process;

a position control portion which carries out position control of at least one of the optical head and the objective lens according to a compensation gain based on a detection signal from the optical head;

a gain adjuster which adjusts the compensation gain of the position control portion; and

a phase adjuster which adjusts a phase of the compensation gain according to adjustment of the compensation gain of the gain adjuster.

18. *(Currently Amended)*: A disturbance learning method for an optical disk device, comprising:

carrying out position control of at least one of an optical head and an objective lens according to a compensation gain, based on a detection signal from the optical head which emits a laser light to the optical disk and receives a reflection light by using the objective lens, thereby carrying out one of a recording process and a reproduction process; and

adjusting the compensation gain ~~in the~~ of a position control portion by a disturbance learning portion, and

adjusting a phase of the compensation gain by a phase adjuster according to a degree of reduction when the disturbance learning portion reduces the compensation gain of the position control portion;

detecting disturbance information of the optical disk by using the optical head; ~~and to store it~~ storing the disturbance information as learning disturbance information, wherein the compensation gain is reduced in a stepwise manner by the disturbance learning portion in a range in which position control of at least one of the optical head of the control portion and the objective lens operates, and disturbance information of the optical disk is detected and stored by the disturbance learning portion using the optical head,

wherein a detector in the disturbance learning portion detects rotation information based on a signal output from the optical head, and carries out learning of the disturbance information at a timing given by this rotation information, and

wherein the disturbance information of the optical disk is stored by the disturbance learning portion in an area corresponding to a predetermined rotation number of the disturbance information.

19. *(Withdrawn)*: A disturbance learning method for an optical disk device according to claim 18, wherein a detection signal detected by the optical head is received to obtain an average value thereof, and the detection signal is increased or reduced according the average value.

20. *(Withdrawn)*: A disturbance learning method for an optical disk device according to claim 18, wherein the position control portion carries out position control of at least one of the optical head and the objective lens based on the learning disturbance information.